

CLAIMS

[1] A surface-mount SAW device comprising:

a mounting substrate composed of an insulating substrate,
5 external electrodes mounted on the underside of said insulating
substrate for surface mounting use, and conductor traces arranged
on the top of said insulating substrate and connected to said
external electrodes;

a SAW chip provided with a piezoelectric substrate, an IDT
10 electrode formed on one surface of said piezoelectric substrate,
and connection pads connected to said conductor traces via conductor
bumps; and

sealing resin layer coated all over the outer surface of said
flip-chip mounted SAW chip and down to the top surface of the
15 mounting substrate to form an airtight space between said IDT
electrode and said mounting substrate;

wherein the crystal structure of the piezoelectric substrate
belongs to any one of point groups C_1 , C_2 , C_s , C_{2v} , C_4 , C_{4v} , C_3 , C_{3v} ,
 C_6 and C_{6v} in terms of Schoenflies symbols;

20 characterized in that charging of the sealing resin layer
is suppressed by increasing the conductivity of said piezoelectric
substrate.

[2] The surface-mount SAW device of claim 1, characterized in
that the conductivity of said piezoelectric substrate is increased
25 by heating an oxidizable element while holding it in contact with
said piezoelectric substrate.

[3] The surface-mount SAW device of claim 1, characterized in that at least one of such metals as Fe, Zr, Al Cr, Mn, Rh, Cu, V, W, U and Sn is contained as an impurity in said piezoelectric substrate to provide increased conductivity of said piezoelectric substrate.

[4] The surface-mount SAW device of any one of claims 1 to 3, characterized in that said piezoelectric substrate is made of LiTaO_3 .

[5] A surface-mount SAW device comprising:

a mounting substrate composed of an insulating substrate, external electrodes mounted on the underside of said insulating substrate for surface mounting use, and conductor traces arranged on the top of said insulating substrate and connected to said external electrodes;

a SAW chip provided with a piezoelectric substrate, an IDT electrode formed on one surface of said piezoelectric substrate, and connection pads connected to said conductor traces via conductor bumps; and

sealing resin layer coated all over the outer surface of said flip-chip mounted SAW chip and down to the top surface of the mounting substrate to form an airtight space between said IDT electrode and said mounting substrate;

wherein the crystal structure of the piezoelectric substrate belongs to any one of point groups C_1 , C_2 , C_s , C_{2v} , C_4 , C_{4v} , C_3 , C_{3v} , C_6 and C_{6v} in terms of Schoenflies symbols;

characterized in that:

said sealing resin layer has a relative dielectric constant of 3.2 or below and a volume resistivity of $1 \times 10^{16} \Omega \cdot \text{cm}$ or below;

the thickness H of the sealing resin layer on the top surface of said SAW chip is 0.02 mm or above; and

5 the conductivity of said piezoelectric substrate is increased to suppress charging of the sealing resin layer.